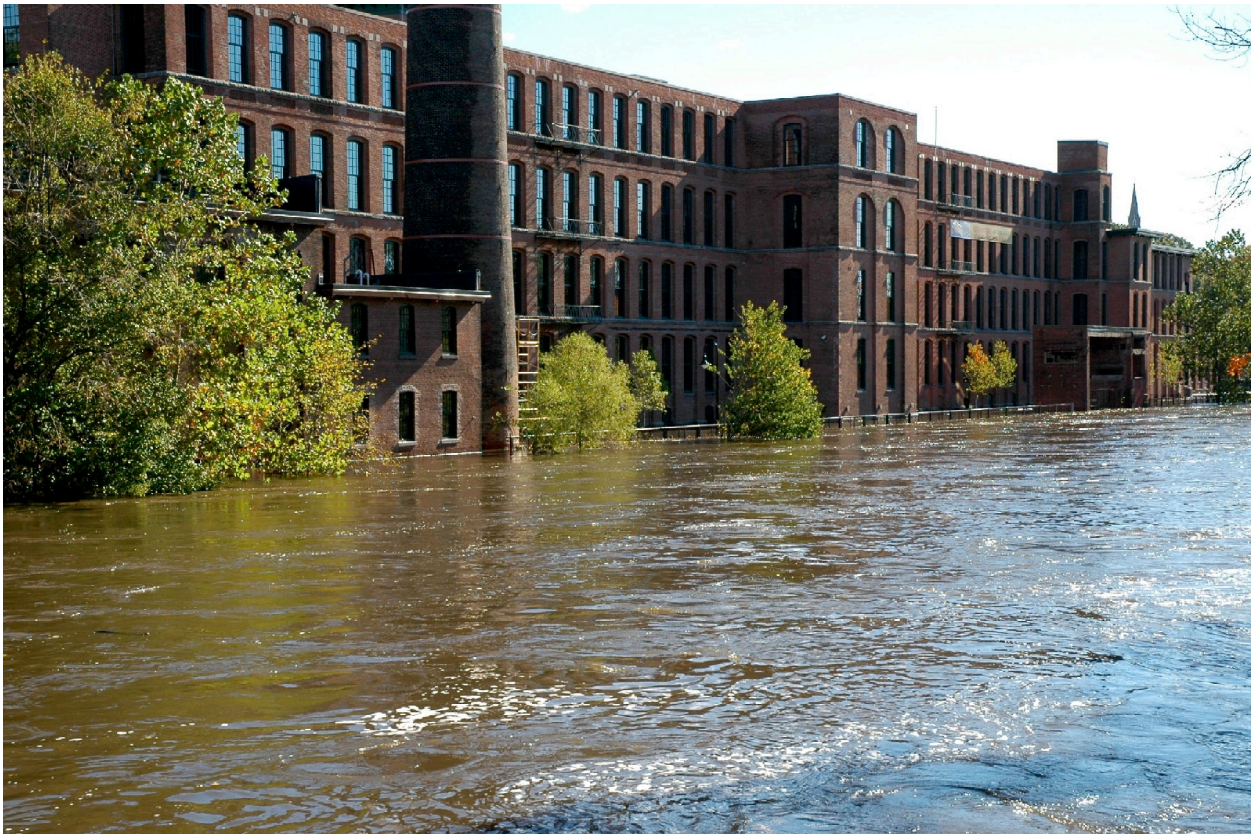
Blackstone Alert



Final Report

For:
The Blackstone Valley Tourism Council

By:
The Resilient Futures Network

Financial Support Provided by:
The John H. Chafee Blackstone River Valley National Heritage Corridor Commission

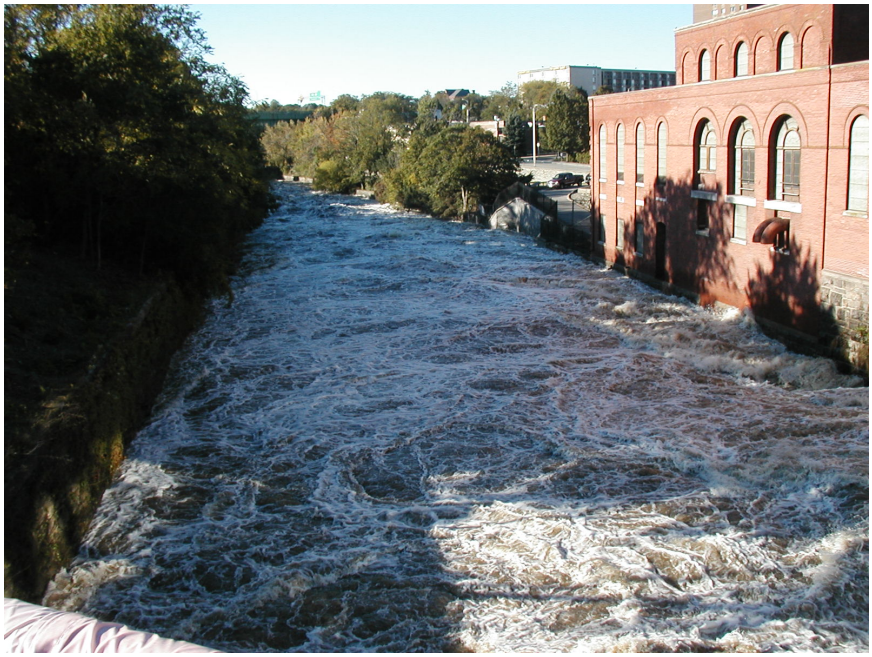
Frederick Presley Consulting, 34 Highland Avenue, Westerly, RI 02891 fredpresley@cox.net

Project Background

The Blackstone River: The Unfolding of the Beauty, and the Beast

Anyone associated with the Blackstone Valley is acutely aware of the work put into reclaiming and accentuating the treasures of the Blackstone River. For over twenty years many people's hearts, minds and time, and millions of dollars, have been invested in reclaiming the beauty that is the Blackstone, and placing it proudly on the local, regional and national registers (and many tourism calendars).

Though this side of the river's personality is by far the most endearing, it is only one facet of what the river is today. The floods of October 2005 saw a different Blackstone River pay little heed to people's investment. Whether traditional, cyclical conditions or new and emergent conditions based on global warming, increased floodplain development or shifting river patterns, the 'beast' emerged to wreak havoc on the valley – particularly downstream in the lower valley.



The October floods took many people and organizations by surprise. So much planning and work that had gone into beautification and river access was greatly impacted or lost. So little planning and work had gone into understanding how to live and work with the beast that emerged.

This project was meant to address this imbalance.

Background: Blackstone Alert

Following the October flood the Blackstone Valley Tourism Council (BVTC) and the Northern RI Chamber of Commerce (NRICC) combined to coordinate a response to both the immediate impact of the flood in the Blackstone Valley, and to organize a

strategic agenda for overall disaster prevention and mitigation in the Valley. Hence 'Blackstone Alert' was born.

Blackstone Alert is a community-driven network and strategic platform for disaster mitigation, prevention and preparedness for the Blackstone Valley. Blackstone Alert does not provide or seek to provide services in the disaster or emergency management areas. Its primary aim is to serve as a platform to network the required capability to ensure the assets of the Valley, given a disaster occurs, are protected in the best and most appropriate manner possible.

The Blackstone Alert Network includes the following key community stakeholders: Representative Kennedy, Senator Whitehouse, Senator Reed, John H. Chafee Blackstone River National Heritage Corridor Commission (BRNHCC), Graduate School of Oceanography at the University of Rhode Island (GSO/URI), Applied Science Associates (ASA), NOAA/ National Weather Services (NOAA/NWS), Hope Global, Pawtucket EMA; the Blackstone River Flood Management Alliance (BRFMA), RI Red Cross, Worcester One Valley System, Blackstone River Coalition, Raytheon, OSHEAN, RI Emergency Management (REIMA), and Mass. Emergency Management (MEMA).

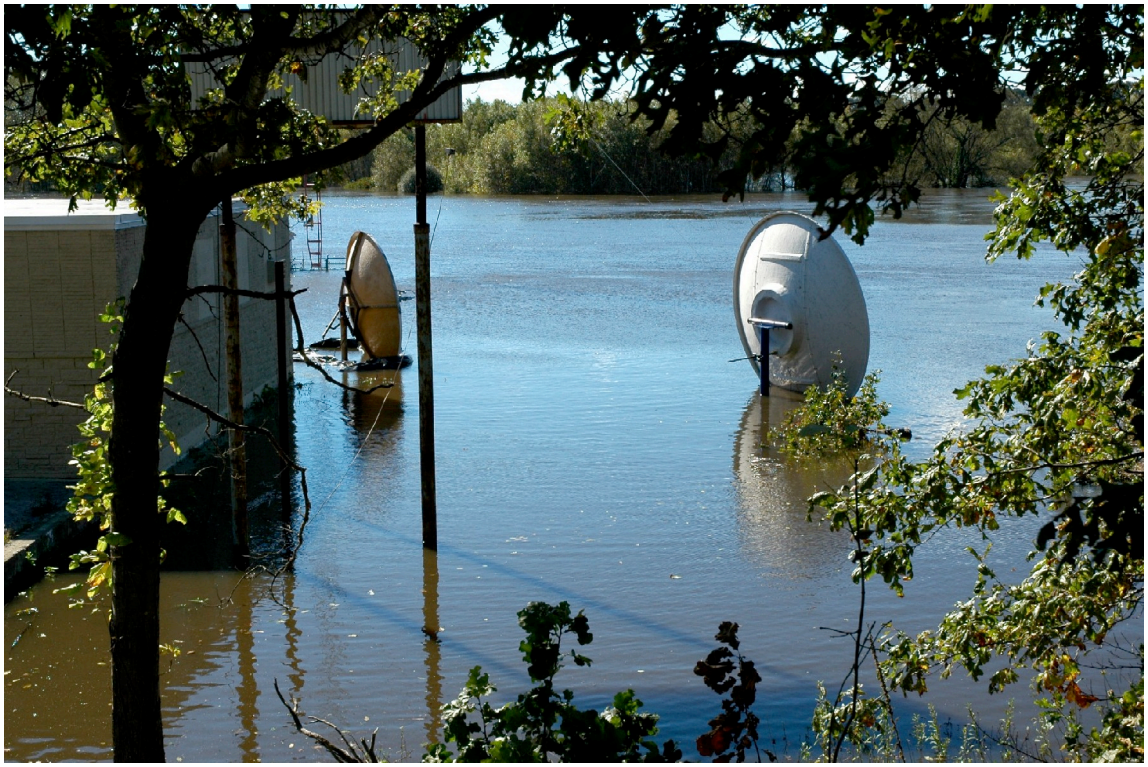
There are three organizations that have been leading and managing the Blackstone Alert initiative – the BVTC, NRICC and the BRNHCC. The recommendations section of this report discusses how the network might continue to provide the vanguard of Blackstone Alert Initiative.

Blackstone Alert took place in three phases:

Phase one measured and documented the impact of the flood, and identified key stakeholders and networks that need to be brought together to form a strategic response. Phase two entailed the holding of a flood forum where key stakeholders and constituents were presented with the findings of phase one. They were also invited to provide additional information to enhance the understanding of the conditions surrounding the flood, and the disaster prevention and mitigation capability available in the region. A small website was also created as away of providing basic information and as a positive gesture in progressing Blackstone Alert.

Phase three of Blackstone Alert entailed:
a) The completion and analysis of data
b) The formulation of an initial strategic approach, and,
c) The convening of a broader stakeholder network to:
- Formalize the leadership and management of Blackstone Alert, and,
- Commence the creation of a broader and more formal strategic action plan.

A key element of the convening of key stakeholders and constituents was the holding of a forum that will focus on the four critical objectives:



1. Identification of the full and accurate facts behind the October 2005 flood, and what can we expect to face in the future,
2. Identification of the capabilities, actions and resources required at a local, regional and national level to prevent and mitigate against such a disaster,
3. The local and regional network and organization required to formalize a strategic response and to manage implementation, and,
4. The resources required to achieve the above.

The topics covered within this agenda were:

- Creating an understanding of the role that disaster prevention and mitigation plays in maximizing investments and creating the opportunity for a more 'liveable' Blackstone Valley.
- The ongoing monitoring of conditions, natural and man-made, within the Valley that will or may enhance the probability of such a disaster occurring again.
- The identification of key networks willing and able to provide capability to plan, implement and manage disaster prevention and mitigation systems.
- The review of all existing organizations, policy and systems to understand their impact on and capability in the prevention and mitigation of damage to federal, state, community, business and NGO assets.
- The creation of a public/private disaster prevention and mitigation system - an 'intelligent system' that proactively informs of and responds to such disaster.
- The improvement in connectivity of key networks within the region in the event of such disaster.
- The creation of a river-system maintenance plan.
- The creation of a system that is unique to the Blackstone Valley watershed that provides the best possible information to those that live, work and visit here.
- The creation of bi-state compact between the higher education systems in MA and RI that can capitalize on the federal investment in this area, and at the same time, provide much needed information and advice.

The initial Flood Forum was held on March 9, 2006, with the 2005 flood still fresh in the minds of the stakeholders. This event was the kick-off to a data gathering initiative that included questionnaires, personal interviews and forum discussions over a 1 year period. The project itself experienced a lengthy delay for various reasons (not the least of which included health issues of the principal investigator). The project resumed in mid-2008 and a new set of interviews were conducted to gage how conditions may have changed since the initial analysis and what actions had been taken as a result of the 2005 event. A follow-up forum was held in the winter of early 2009.

Results and Findings

Key issues related to the 2005 flood event dominated the stakeholders' concern. They were:

1. Information and notification of the severity and timing of the flood was severely deficient. There were millions of dollars of material and work hour losses that were incurred by businesses along the river that could have been greatly reduced of avoided completely with better and more timely information.

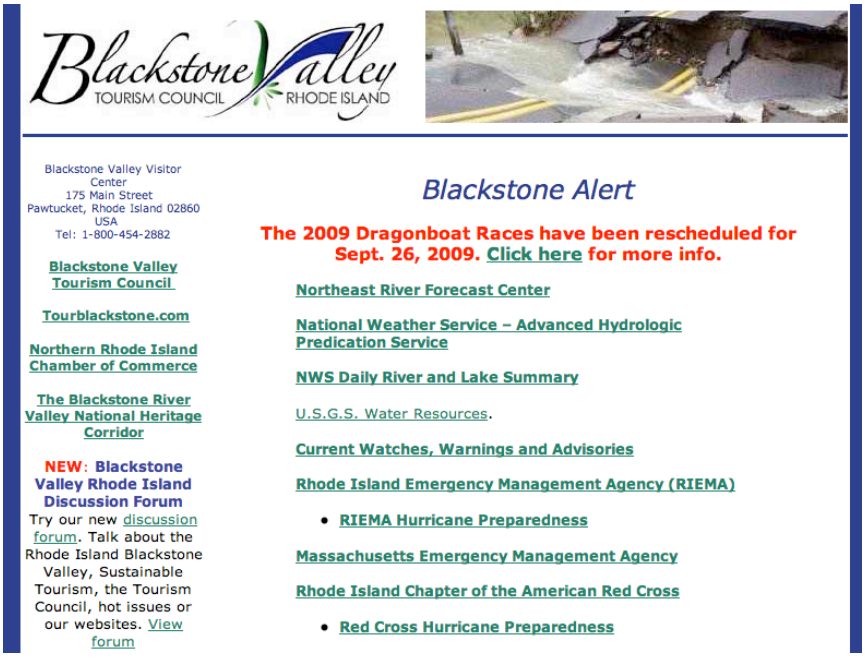
2. Debris within the river and along its banks have gone unmanaged and as a result was a major factor in the damage experienced by some stakeholders.
3. Communication between communities, states, and key stakeholders was lacking.
4. Resources and funding necessary to improve the major issues related to flooding impact have not been a priority to this point.
5. Historic and current land use plans have contributed to the magnitude of the damage along the river by increasing impervious area and stormwater runoff in the watershed.
6. Weather Data suggest that rain events of similar or possibly even greater magnitude are becoming more frequent and the impact of those events will be greater than historical data suggest due to the changes in land use and river flow.

Communities themselves seemed to be well prepared for the event. All communities reported only minor losses from flood damage. This was in part attributed to many communities having existing flood management strategies either in place or under development.

Initial Steps Taken

There have been several significant steps that have been taken since the 2005 flood that, have already and will undoubtedly in the future, greatly reduce impacts of flood events. These include:

- The establishment of a Blackstone Alert System and Website: The BVTC has taken the lead and created an alert systems that sends notifications out to stakeholders when storm events and/or river conditions suggest that action may be required to avoid impact. There is also a website devoted to the alert system,



www.blackstonealert.com. This systems has been very effective and well received by the stakeholders. It has been initiated on numerous occasions since its inception. There is still a need for long term funding of this initiative, which to date has been largely funded by the BVTC.

- Individual stakeholders most impacted by the floods have implemented their own strategies to contend with future storm events.
  - Hope Global has completely redesigned the production floors and storage areas that received the greatest damage, elevating machinery and product out of the flood zone. They have also hired their own environmental coordinator who monitors the river at all times. They have developed an elaborate action strategy for employees that has several stages determined by the height of the river and forecast. The goal of the strategy is to ensure human safety first and then to limit any material and operation losses due to flooding.
  - RYCO has also done significant redesign of their facility to keep the operations and products out of the flood waters.
- RIEMA has greatly enhanced their communications capabilities with local communities is able to provide accurate and timely information via the Northeast Disaster Information Exchange Network. They also have a WEBEOC which is a web-based emergency operations center that is connected to local municipalities.
- Senator Reed has secured some funding for flood studies along the Blackstone.
- National Weather Service has new forecasting capabilities for river stages

Remaining Issues and Concerns

Despite the impressive and important action steps (many of which were born of the initial forum discussion), much still needs to be addressed.

Monitoring and Notification

It was clear that all stakeholders felt strongly that there were not enough river gages in place along the Blackstone to provide the necessary data to monitor and accurately predict river levels downstream. Funding for these gages has decreased in recent years and gages have been cut back. The US Geological Survey, the group that operates and maintains the gages, have empathized with stakeholders but would need more funding to be dedicated for additional gages and the maintenance of existing and proposed gages.

Several stakeholders (Schools, Communities, businesses) along the river have deployed staff gages where there are no mechanical gages in place. These gages are read and recorded at varying intervals. This data is used by the groups recording the information but there is no network that currently shares this information nor is there any calibration of the gages to one another.

National Weather Service monitors the existing USGS river gages and uses that data for forecasting river flood stage. Additional gages could enhance their ability to forecast in the future. There is also the potential for them to utilize the staff gage measurements from the various stakeholders if that data could be coordinated and organized.

The Blackstone Alert System established by the BVTC could potentially serve in the role of coordinating all of these various data sources but the system does not run and manage itself. It requires resources to continue. So the question here is who pays for that to continue? Who will manage the systems moving forward? These are questions that need to be addressed in the very near term.

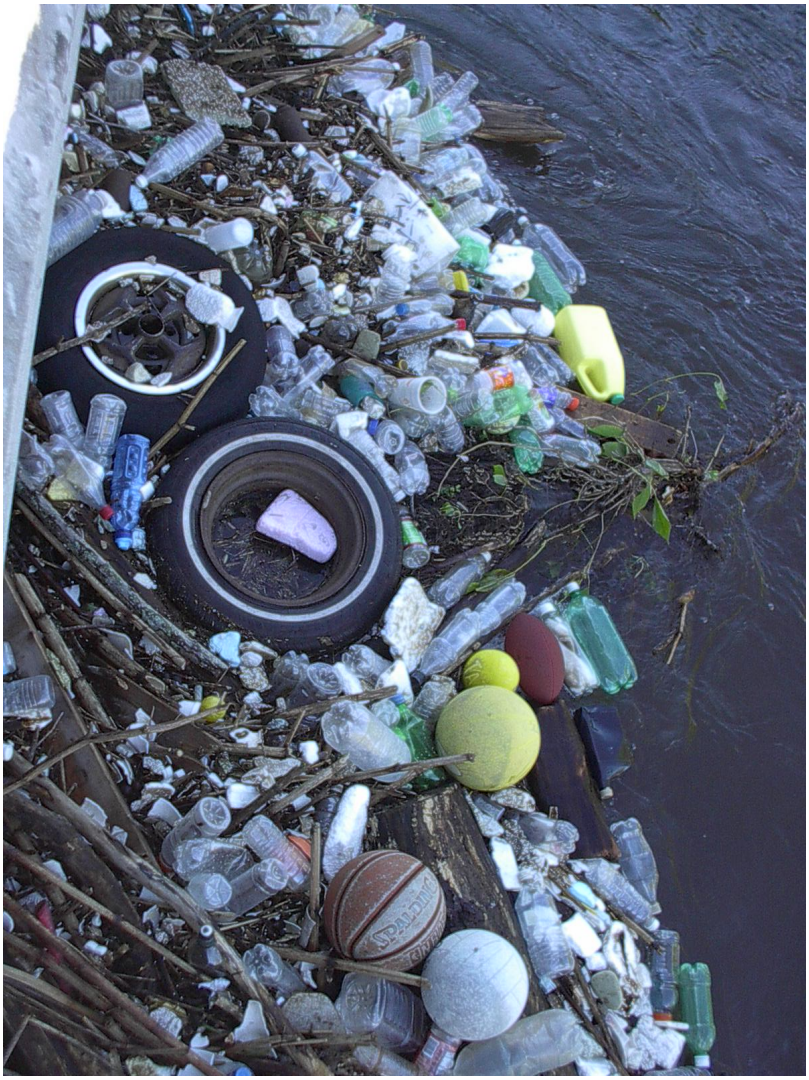
Dam releases were also a potentially major contributor to localized damage during the storm. There is no coordinated systems for dam releases in the valley and therefor each dam operator is looking out for their own assets when they are determining when and how much water to release. It is impossible to calculate the full extent of the damage that may have been the result of such actions in 2005 but it is clear that a coordinated system of dam release could have mitigated some of the impacts.

Debris Removal/Management

Debris flow had a major impact in the river's lower reaches. It was debris and not water that was responsible the damage to the Central Falls Landing. Much of that debris can be traced back upstream to areas in the floodplain where material was being temporarily stored. Currently there is no regulatory program that monitors or enforces these storage sites.

Martin Street Bridge Construction Site 2 p.m. Saturday, 10-15-05

In addition to stored materials along the floodplain, debris from dumping, runoff, and tree falls was also very apparent both before and after the October '05 storm. Large tree limbs and other wooden objects in the river become projectiles in swift river currents. Large debris can also threaten the integrity of some of the smaller dams along the river, can snag and collect smaller debris, and be a hazard to boaters and fishermen.

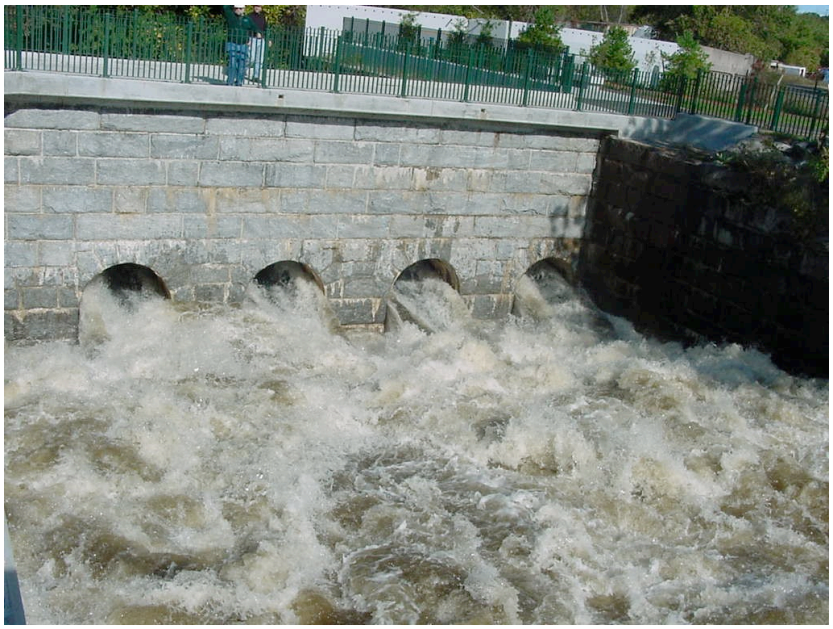


Volunteers with Friends of the Blackstone River and the Blackstone River Watershed Council have performed numerous river clean-ups that have included removal of in-river debris. Ultimately though, the issue is far more than a volunteer effort can handle. Funding for debris removal and floodplain storage and disposal management and enforcement is needed to greatly reduce the debris on and along the river. The volunteers could be a major component of the this initiative but should be compensated for their work and reimbursed for their material costs.

Storm Magnitude and Frequency

Rain events are categorized by how frequently storms of a given magnitude are likely to occur using past rainfall records as a reference. The reoccurrence interval is based upon statistical techniques, through a process called frequency analysis, are used to estimate the probability of the occurrence of a given precipitation event. Based upon the most recent data gathered by the National Weather Service, what has been considered a 100-year storm (a storm that has a 1 percent chance of happening any given year) is now actually considered a storm of much greater frequency. The implications of this are

significant when one considers that all stormwater control structure are designed to meet certain frequency events (usually the 100-year event). If the frequency of such events are substantially greater, many of these structures are under designed and are now and will in the future be insufficient to handle many of the major rain events that occur. This has great implications on the impact to both water quality and water quantity in the river. It also can be a contributing factor to much of the localized flooding events. Water reaches the river much faster and in greater quantities if the systems designed to capture and store it are undersized.



The Blackstone Watershed received over 15" of rain in October 2005. Much of that fell within a very small 9-day window of time. The stacking of rain events in close succession like that is very similar to what occurred in 1955 when a series of tropical storms hit the area in close succession. Those events brought the rivers height to a level that was only 2" higher than what we saw in 2005. In contrast however, the amount of actual precipitation was almost double (approximately 30") in 1955. What this indicates is that land use across the watershed and particularly adjacent to the river and its tributaries has increased substantially and it takes far less water to cause the similar severity of floods than it did fifty years ago. Much of the zoning in the watershed does not consider any of this. Development continues to increase in the more rural and suburban communities in the Valley. And the stormwater systems being designed to deal with water runoff are likely under designed. This all adds up to the likelihood that we can expect the type of flooding events we experienced in October of 2005 to occur in far greater frequency in the future. So how do the watershed stakeholders cope with this reality.

Recommendations and Next Steps

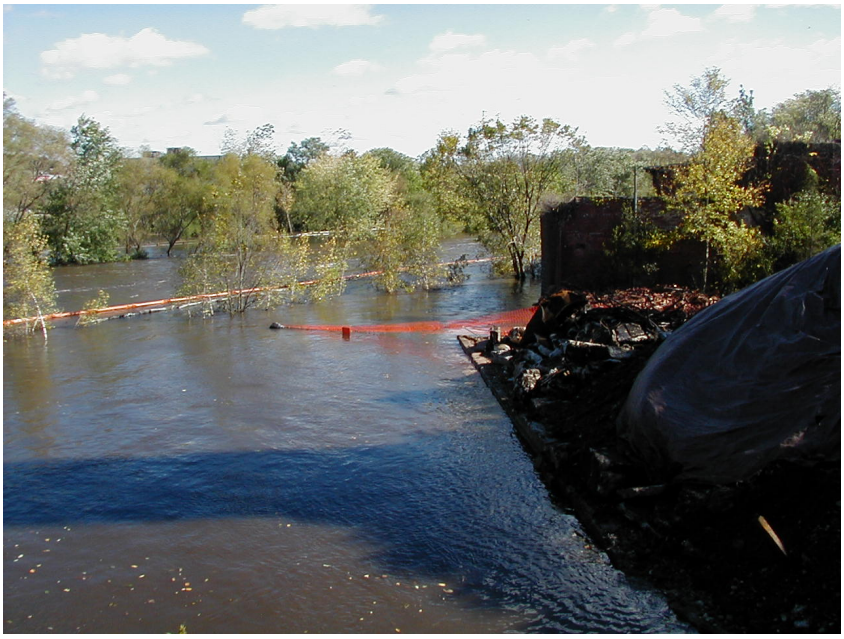
The Blackstone RIver is a tremendous asset to all of those who live work and play in the Valley. It provides countless recreational opportunities, aesthetic beauty, electrical power, valuable habitat and many other benefits. It is the reason for the Valley's rich industrial history. But as with all natural systems, there are time when the river must

adapt to major shock events. Storage along the river floodplain is how the river has traditionally dealt with major rain events. We as humans interacting with this natural system have failed to show an understanding of the value of that floodplain and have built structures upon it over the years. We did this often with the knowledge that from time to time, there would be flood events that would inundate the structures. Sometimes we did so without that understanding. The cumulative impacts of our actions over time have altered the way the river responds to major rain events and now we too must adapt to these new conditions.

The Blackstone Alert Project is an important first step in the process. As stated earlier, many key follow-up steps have already taken place but they have taken place largely as individuals or organizations reacted to the 2005 event. What is needed now is a coordinated effort to prepare the valley stakeholders for future shocks to the river system.

A Unified Strategy for River Resilience

The valley would greatly benefit from a unified strategy that deals with not just response and reaction to major events but also addresses some of the longer term issues of land use and river flow changes. To be effective, every community along the river and floodplain must be committed to the process of developing and implementing the strategy. Difficult decision will be required by federal, state and local officials as they grapple with the reality of the fact that the river floodplain of today may need more room to function properly or major structural controls to compensate for the lack of sufficient flood storage areas. This might mean substantial changes to community zoning regulations, state and federal floodplain regulation and potentially even the relocation of homes and businesses in the floodplain. Whatever the decisions that may come, it is clear that something must be done unless we want to see a repeat of the events of October 2005 and potentially even greater impact. The funding secured by Senator Reed's office might contribute to the development of the strategy or some other source may need to be identified. It is also important that a group or organization be identified to take the lead on managing the



effort. The BVTC has been a critical leader in this effort to date and if they have the resources and desire to continue in this capacity, they might be a logical choice. Otherwise, some other entity that is not geographically restrained (to one or more towns or one state of the other) needs to be identified to manage this critical piece. If and when the Blackstone Valley Institute is fully operational, they might be a logical group to either manage the process or at least support the efforts of the BVTC.

Blackstone Alert Notification

The notification and alert systems established by the BVTC has been a major contributor to the stakeholders awareness of river levels during large rain events. The system notifies stakeholders when flood warnings are posted and provide them with links to the National Weather Service and USGS gage data. This effort has proven effective and can continue to be a key piece in the overall strategy for Blackstone Alert but stakeholders must find a way to fund the effort whether it be through the BVTC or some other organization. Possible funding sources include federal and state grants, stakeholder contribution, a fee-based system, a donation model or some combination of these. What is clear is that some sustainable funding mechanism needs to be considered moving forward to maintain this important resource.

Monitoring Stations

Stakeholders were unanimous in their assertion that there are simply not enough gaging stations along the river and its major tributaries to provide the necessary level of data required to effectively respond to major rainfall events. The USGS has stated that the funding for any new stations and the maintenance of all stations will need to be allocated before this situation will improve. There have been a number of funding cutbacks over the years that have put even the existing stations in jeopardy. Part of the strategy developed for the river should include dedicated funding for new stations and a budget for maintenance.

Debris Management/Removal

Debris flow was a major contributor to the damage caused by the flood of 2005. This is true of any flood event on any river but it is clear that much of the major damage (particularly to Central Falls Landing) could have been avoided or at least greatly reduced, had a Debris Management/Removal program been in effect on the river. This is no small undertaking. The resources in human work hours, equipment and funding

necessary to initiate an effective program is substantial. There are however existing activities that might be enhanced by funding support to greatly improve the situation. Friends of the Blackstone and the Blackstone River Watershed Council regularly conduct river clean-ups and debris removals but their resources are limited and would need additional support to make this a more effective program.

Conclusion

Each of these recommendation require stakeholder commitment, funding and resources to be realized. There has already been great deal of commitment and resources allocated to the work done thus far. It is critical that the stakeholders stay focused on the tasks that need to be conducted and work together to get the funding necessary to make these action steps possible. The development of a Unified Strategy for River Resilience is the key element of the recommendations that could serve to keep all of these efforts moving forward. The effort requires a champion to keep the issue top of mind and keep stakeholders committed to the goals. The BVTC has been that champion to date and could continue in this capacity but as a non-profit organization with limited resources themselves, they would require financial assistance to continue in this role. The Blackstone Valley Institute may be able to assist in this role if and when they are formally established and staffed.